

and such winds did not, as a rule, correspond at all with the "kite winds." Wind data taken on shore and near the earth—say within 100 feet or so—are utterly at variance with those obtained in the "free air" above the surface of the sea. Hence, empirical formulas based upon surface data are worthless.

The velocity of the wind as indicated on the summit of Diamond Head was from two to three times as great as that indicated at the United States Weather Bureau station in Honolulu.

Ballisticians have arbitrarily assumed that the drift of the projectile is independent of wind conditions, whereas a little *a priori* reasoning would have shown the fallacy of this assumption. But, be this as it may, our firings proved conclusively that the drift did vary with changes in wind conditions.

All who have followed this discussion will undoubtedly agree that the coast artilleryman attempting to hit a moving target at sea has a pretty problem to solve, considering that his accuracy of fire depends upon unknown aerological conditions, unknown variations in drift, and unknown changes in the muzzle velocity of the powder employed.

551.5 (73)

WEATHER BUREAU EXHIBIT AT THE FIRST PAN AMERICAN AERONAUTIC EXPOSITION.

By WILLIS RAY GREGG, Meteorologist.

[Aerological Investigations, Weather Bureau, Mar. 14, 1917.]

The First Pan American Aeronautic Exposition was held in the Grand Central Palace, New York City, February 8 to 15, 1917. The purpose of this exposition was to stimulate general interest in aeronautics by means of exhibits and to promote the more rapid advancement of this science by means of addresses and discussions. The latter were given each day in the Convention Hall and were illustrated by lantern slides and motion pictures. Of considerable interest among these was the Weather Bureau's motion-picture illustration of meteorological kite flying at the Drexel Aerological Station.

The exhibits occupied the two lower floors of the palace. Those on the first floor consisted, for the most part, of different types of aeroplanes, an interesting feature being the first motor-driven machine, in which the Wright brothers made a successful flight at Kitty Hawk, N. C., in 1903. In the open court above the first floor were suspended a large military kite balloon and a model of a manned free balloon. These and some other details of the first-floor exhibit are shown in figures 1 and 4.

On the second, or mezzanine, floor were shown models of aeroplanes and dirigibles, various types of motors and some of the later designs of propellers. There were also exhibits, consisting principally of pamphlets for distribution, by the Pan American Union, the National Security League, and the National Advisory Committee for Aeronautics. A part of this floor was devoted to exhibits by some of the Government departments, including the Bureau of Standards, Coast and Geodetic Survey, Army and Navy, Postal Service, and the Weather Bureau.

The Weather Bureau exhibit consisted of most of the instrumental equipment usually shown at expositions and, in addition, some of the instruments, apparatus, etc., used by the Aerological Division. The usual exhibit has already been described in previous numbers of the MONTHLY WEATHER REVIEW. (Vol. 43, p. 452, and vol. 44, p. 459.) Besides these instruments there was also shown a Robin-

son anemometer so modified that electric contact is made for each one-sixtieth of a mile of wind blown, thus enabling the observer to determine the current hourly velocity by merely counting the number of contacts made in one minute (see this REVIEW, 44:288). An electric fan operated this anemometer; also one connected in the usual way with the triple register. The latter and a barograph and thermograph were kept continuously recording. Much interest was shown in these instruments and in the glass weather map, which showed the weather conditions and the forecast for each day. The general arrangement and appearance of this part of the Weather Bureau exhibit are shown in figure 2. A large number of descriptive pamphlets on "The Weather Bureau" and "Explanation of the Weather Map"; also cards explaining the flags used for warnings were distributed during the exposition.

The aerological exhibit included a kite, kite reel, recording theodolite, 2 kite meteorographs, 1 balloon meteorograph, piece of sounding balloon rubber, a number of free air records obtained by means of kites, captive and sounding balloons, and copies of the Mount Weather Bulletin and Monthly Weather Review containing summaries of free air work. Figure 3 shows the kite, with meteorograph attached, kite reel and some of the instruments; in figures 5 and 6 the instruments can be seen in somewhat greater detail. All of this apparatus has been in regular use by the Weather Bureau, except the recording theodolite which is of recent design and construction. Its use in pilot or sounding balloon work will require but one observer, whereas, with the non-recording theodolite, it has been necessary to have two observers; one to keep the balloon on the cross hairs, the other to record the angular readings. Much interest was shown in these instruments and in the piece of sounding balloon rubber, it being pointed out that all of our pure rubber balloons have been obtained from Europe and that no satisfactory samples have yet been produced in this country.

Greatest interest was apparent in the meteorograph records, which were briefly described on attached cards, and in the summaries of free-air data. It was evident that comparatively few of those actively engaged in aviation are aware of the existence of tables and charts showing temperature and wind conditions at various levels and under different conditions of pressure distribution at the earth's surface. The direct bearing and value of this work to aviators was emphasized, with the result that there were numerous requests for the summaries already published and for all publications along this line that may be issued in the future.

551.596 (41)

SOUND AREAS OF THE EXPLOSION AT EAST LONDON, JANUARY 19, 1917.¹

By CHARLES DAVISON.

It is not often that a great explosion occurs near the center of a populous area, and the recent disaster in East London, England, thus offers an opportunity of adding to our knowledge on the transmission of sound waves by the atmosphere. * * * The most remarkable result [of recent investigations in this subject] is the recognition of the fact that there exists sometimes, not always, a zone of silence which separates two detached sound areas. This zone has been traced in 20 recent explosions (excluding that of Friday, January 19), two

¹Condensed from *Nature*, London, Feb. 1, 1917, 98: 438-439, by W. G. Reed.